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CROSS-SECTORAL ISSUES, WITH PARTICULAR REFERENCE TO THE CRITICAL ELEMENTS OF SUSTAINABILITY

Letter dated 28 February 1996 from the Chargé d'affaires a.i. of the Permanent Mission of the Netherlands to the United Nations and the Chargé d'affaires a.i. of the Permanent Observer Mission of Switzerland to the United Nations addressed to the Secretary-General

The Permanent Mission of the Netherlands and the Permanent Observer Mission of Switzerland to the United Nations have the honour to transmit to you the report of the International Expert Meeting on the Assessment of technological Needs for Sustainability (see annex),** which was held in Scheveningen, Netherlands, from 5 to 7 February 1996. The meeting was jointly organized and sponsored by the Governments of the Netherlands and Switzerland.

The objective of the initiative undertaken by the Netherlands and Switzerland is to facilitate dialogue and exchange experiences regarding national needs assessment as a supporting tool for the improved utilization of environmentally sound technologies in the transition towards sustainable development, in particular in developing countries and in countries in economic transition.

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** The annex is being circulated in the language of submission only.

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We would be grateful if you could make arrangements to circulate the attached report as an official document of the Commission on Sustainable Development at its fourth session.

(Signed) Arjan HAMBURGER
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Permanent Mission of Netherlands
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Annex

Summary Report of the International Expert Meeting on the Assessment of Technology Needs for Sustainability

Scheveningen/The Hague (The Netherlands), February 5-7, 1996.

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Preface

This document is a summary report of the "International Expert Meeting on the Assessment of Technological Needs for Sustainability", which was held in The Hague (Scheveningen), The Netherlands, from 5 - 7 February 1996. The meeting was convened to provide a contribution to ongoing discussions on the subject of technology transfer and capacity building, in particular in the framework of the UN Commission on Sustainable Development and the OECD/IEA Climate Technology Initiative.

The meeting was organised by the governments of the Netherlands (Directorate General for Environment/Department of Clean Technologies) and Switzerland (Federal Office for Foreign Economic Affairs/Development Policy Division). About 40 experts representing national governments, international organisations, industry and research institutes, from both the developed and the developing world participated in the expert meeting.

The meeting has resulted in a number of conclusions and recommendations, regarding the use, strategy and methodology of National Needs Assessments for technological capacity building. The conclusions and recommendations have been elaborated into a "Guidance document on NNAs regarding ESTs", which aims to provide guidance on the use of NNAs, to countries or organisations planning to initiate or strengthen their capacity building efforts.

The recommendations and conclusions, as well as the guidance document, are included in the present document. For a list of participants as well as a summary of the discussions and the presentations, reference is made to the full report of the expert meeting on NNAs.

The expert meeting on National Needs Assessment has been a fruitful and pleasant workshop. On behalf of the Netherlands and Swiss governments, the organisers would like to thank all participants for their active and constructive contributions. Also, the organisers wish to thank the Secretariat of the UN Commission for Sustainable Development. Their supportive role in the process has been of great value.

1. Conclusions

1. Having recognised the importance of practical transfer and co-operation projects regarding Environmentally Sound Technologies (ESTs), the meeting convened in order to discuss the use of National Needs Assessments (NNAs) as a tool to improve the utilisation of ESTs in the development process of developing countries and countries in economic transition ([1]). In addition to ongoing technology transfer projects, NNAs should be undertaken to discover less obvious EST-opportunities, which upon implementation will contribute to both socio-economic development and environmental improvement. The ultimate objective of a NNA is to initiate and implement a selected number of priority projects in capacity-building regarding ESTs and transfer of prioritised EST-options.

1.1 Concepts and definitions

2. A National Needs Assessment (NNA) is a tool for the government or other national stakeholders of a particular developing country or country in economic transition (designated as the 'host country') to define a portfolio of capacity building actions and technology transfer projects to be undertaken to facilitate, and possibly accelerate, the development, adoption and implementation of Environmentally Sound Technologies (ESTs).

3. Environmentally Sound Technologies (ESTs) are technologies (hardware and software) which contribute, in the particular national situation, to achieving or restoring the balance between objectives regarding social development, economic growth and sustainable use of natural resources (including protection of the environment).

4. The meeting concluded that the improved utilisation of ESTs in the development process of developing countries and countries in economic transition requires the strengthening and developing of capacities in several fields, in particular: identification of technology shortcomings in available technological options, training of industry, institutional and government leaders, technological R&D institutions and those institutions which facilitate the dialogue between national stakeholders, and education of the public on the importance and need for transition towards sustainable development.

5. The meeting recognised that the transfer of ESTs:

   (a) encompasses transfer of technologies both between and within countries, and modification and adaptation of technologies used elsewhere; and

   (b) involves at least four steps, respectively: (i) creating awareness of the need for ESTs; (ii) developing capacity for the absorption and/or adoption of ESTs, (iii) obtaining information and assessment of technological options, and (iv) implementing technology selection and managing technology changes.

1.2 Added value

6. There is an evolving interest in the use of NNAs, because:

   (a) capacity building regarding ESTs is an essential condition for effective technology transfer to take place;

   (b) capacity building efforts are most likely to be successful once these efforts are based on the result of a solid assessment of the technology needs of the host country and once this needs assessment is endorsed by the most important stakeholders of the respective host country;

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[1] *The particular developing country or country in economic transition for which the NNA is undertaken is considered to be the 'host country' for that particular NNA.*

(c) it may contribute to obtain participation of the private sector in its entity as owner of most technologies and source of finance, in the transfer of ESTs to, among and within developing countries and countries in economic transition;

(d) it may contribute to obtaining participation of those sectors in which there is a large public sector involvement (like agriculture, energy, etc.); and

(e) it may contribute to exploit the potential of ESTs to contribute to the transition towards sustainable development in developing countries and countries in economic transition.

7. The meeting identified among others the following **added values** for NNAs, provided the NNA is properly followed up by capacity building actions and technology transfer projects:

(a) to the ***national government of the host country***: The NNA generates a portfolio of (i) capacity building actions which facilitate, and possibly accelerate, the development, adoption and implementation of ESTs, and (ii) technology transfer projects regarding ESTs;

(b) to the ***international community and donor agencies***: The NNA presents an opportunity (1) to emphasise the 'demand-driven' approach and tailor international capacity building actions regarding ESTs to the actual needs of the beneficiaries in the host countries, and (2) to prepare technology transfer projects regarding ESTs which can be undertaken by the private sector and thereby use the potential technology offer and financing capacities of the private sector;

(c) to the ***different stakeholders in the host country***: The NNA-process and its follow-up offers to the different stakeholders, such as private sector, scientific and R&D community, NGOs, etc., in key sectors, such as agriculture, manufacturing, etc., in the host country an opportunity to enter into a national dialogue regarding socio-economic and environmental strategies and to participate in the planning and execution of capacity building actions and technology transfer projects regarding the uptake of ESTs; and

(d) A NNA is undertaken to discover ***less obvious EST-opportunities*** in order to contribute to both socio-economic development and environmental improvement. In bringing different stakeholders together and enhancing dialogue, the NNA could also discover niches for win-win-solutions.

8. The meeting also recognised that additional practical experiences are required to fully explore, and substantiate, the added values of conducting NNAs.

1.3 Methodology

9. The preparation and execution of the NNA, as well as the management of its follow-up, will benefit from a methodology, which outlines the various phases, indicates the expected outcome and facilitates the participation of stakeholders.

10. NNAs may be undertaken in several different ways. The approach is to be tailored to the national circumstances, the anticipated follow-up for the NNA and the objectives of the initiators, project partners and organisers. Before initiating a NNA, a number of strategic choices will have to be made on the basis of the scope of the NNA, the motivation of stakeholders and project partners which will determine among other aspects the entry point for the NNA. In general, a division is possible with respect to the depth (level of detail of the analysis) and width (coverage of socio-economic and/or environmental issues) of the assessment.

On the basis of the experiences gained so far, the meeting concluded that two types of NNA are most likely to be successful ([2]:)

(a) comprehensive-coverage NNA based on comparatively-superficial analysis (designated as type 2 NNA)

and,

(b) partial coverage NNA based on comparatively in-depth analysis (designated as type 3 NNA).

1.4 Strategy

11. The execution of a NNA is only likely to be successful when favourable conditions are met in the host country. These conditions are:

(a) awareness of the socio-economic and environmental benefits of ESTs;

(b) motivation of important, national stakeholders to participate in the NNA-process, including management of its follow-up;

(c) proper qualification of the institutions in charge of the execution of the NNA; and

(d) availability of medium to long term national, socio-economic and environmental planning.

12. The proper follow-up of a NNA calls for concerted action among key players, including the national government of the host country and its agencies, other organised national stakeholders, beneficiaries of the prioritised capacity building actions and technology transfer projects, donor agencies and local NGOs.

13. The meeting concluded that the follow-up of the NNA is most likely to be successful in case:

(a) the execution of the NNA is managed in such a way that it results in strengthening the institutional framework for the implementation of policies and strategies fostering the use of ESTs;

(b) responsibility for co-ordinated implementation and review of follow-up projects is assigned to a high level body, with participation of national stakeholders; and

(c) project partners formulate challenging proposals regarding the prioritised capacity building actions and technology transfer projects.

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[2] *A detailed description of the different types of NNA is given in section 3.3 of the annexed Guidance document on National Needs Assessments regarding Environmentally Sound Technologies for Developing Countries*

2. Recommendations

2.1 General methodology

1. The NNA should be considered as a continuous and iterative process, which can logically be organised in three phases, respectively:

   (a) ***Creating an enabling environment:*** Setting the stage for a NNA-process, by (i) creating favourable conditions, through either awareness raising and communication with stakeholders, and/or execution of pilot projects regarding transfer/acquisition of ESTs; and (ii) defining the NNA-project (problem definition in order to set objectives, define participation of stakeholders, develop the organisational framework and raise necessary funds);

   (b) ***Assessing capacity building needs:*** Actual execution of the assessment tasks through data analysis and consultation of national stakeholders, resulting in a portfolio of prioritised capacity building actions and technology transfer projects; and

   (c) ***Strengthening and developing capacities***: Implementation of the portfolio of prioritised capacity building actions. Such capacity building results in the application of ESTs, the definition and implementation of technology transfer projects regarding ESTs and an ongoing dialogue among national stakeholders, government and financing institutions regarding the implementation of ESTs. This phase also includes review activities in order to sustain the continuous process of assessing capacity building needs regarding the application of ESTs and building prioritised capacities.

2. On the basis of the experiences gained so far, it is suggested to apply the following types of NNAs ([3]):

   (a) ***Comprehensive coverage NNA based on comparatively superficial analysis (type 2)***; in particular
   (i) to develop or broaden general strategies to promote the development, acquisition/transfer, use and dissemination of ESTs or
   (ii) to identify priority socio-economic sectors or environmental problems, in which ESTs are most likely to significantly support the development process of the developing country or country in economic transition;
   or

   (b) ***Partial coverage NNA based on comparatively in-depth analysis (type 3)***; in particular to prepare a detailed action plan for the improved utilisation of ESTs in the development of a particular socio-economic sector or in the abatement of a particular environmental problem.

   In order to exploit the potential of NNAs, it is also suggested to apply NNAs in a tier-wise mode, with alternatively type 2 NNA and type 3 NNA. Whether it is most appropriate to start with a type 2 NNA or with a type 3 NNA depends on local objectives and circumstances. A type 2 NNA could most usefully be undertaken to develop national strategies and plans, whereas a type 3 NNA based on these plans could define concrete actions for capacity building as well as define specific technology transfer projects.

3. The NNA-process should be 'transparent' and 'participatory'. It should reflect the views of national stakeholders involved as well as the compatibility with national policies, in particular with regard to priority setting between technological options, priority setting among environmental problems and priority setting regarding options for capacity building.

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[3] *A detailed description of the different types of NNA is given in section 3.3 of the annexed Guidance document on National Needs Assessments regarding Environmentally Sound Technologies for Developing Countries*

2.2 Phases of the NNA-process

Phase 1: Creating an enabling environment

4. Creating an enabling environment is important for enhancing the effectiveness of the NNA-process. Thus, it is recommended to:

- conduct a survey among stakeholders (including industry, government, NGOs, R&D community etc.) in order to identify which (policy-) initiatives are already undertaken and to take the results of these initiatives into account while defining the NNA;
- assure that local institutions have the ownership of the execution of the NNA;
- identify a strong and committed local actor to take the lead in the execution of the NNA;
- ensure participation of national stakeholders throughout the NNA-process;
- tailor the objectives of a particular NNA to long term environmental and socio-economic strategies and policies, provided that such strategies and policies are the result of a participatory process within the host country;
- build capacity in local institutions to undertake and manage the NNA-process; and
- make a preliminary assessment of the potential for funding of follow-up actions from resources available in the national and international, public and private sectors and tailor follow-up actions to the realistic funding opportunities.

5. The organisers of the NNA should explore potential funding opportunities to be able to undertake at least a few selected follow-up projects identified by means of the NNA.

Phase 2: Assessing capacity building needs

6. In order to ensure implementation of follow-up actions, the NNA should sustain awareness and commitment of national stakeholders and contribute to institutional capacity building. This cannot be done through a blue print approach; the approach should be adapted to nationally and internationally available information sources, match socio-economic conditions, use existing networking structures and technological and organisational capacities. In general, the assessment phase should include three main assessment tasks, respectively:

(a) ***Identification and selection of EST needs and opportunities***: Inventory of technological options to alleviate environmental problems and preliminary evaluation of those options on economic, technical, cultural and environmental impacts in order to select the most promising technological options;

(b) ***Assessment of capacities:*** Assessment of the barriers and incentives regarding the application of the ESTs and formulation of capacity building needs; and

(c) ***Setting priorities for capacity building actions and technology transfer projects***: Comparative evaluation of capacity building needs and prioritisation of follow-up actions (including capacity building actions and technology transfer projects).

7. The execution of the first assessment task encompasses both an inventory of ESTs and the selection of those ESTs relevant in light of the objectives of the NNA.

The **inventory** should be based on the results of the following three inter-related surveys:

- ***Survey of environmental problems:*** Covering target national or regional environmental problems (including inefficient use of resources) and anticipated developments therein;
- ***Survey of socio-economic conditions:*** Covering socio-economic conditions under which the target socio-economic sectors are operating and - whenever feasible - the anticipated developments in socio-economic conditions; and
- ***Survey of appropriate technological options:*** Covering appropriate technological options to reduce a particular environmental problem caused by a particular socio-economic sector.

With a view to identifying the most appropriate EST needs and opportunities, the **selection process** should take into consideration:

- The perceived societal goals, which could determine the choice between an environmental approach (starting with the survey of environmental problems and opportunities and giving first priority to environmental impact) or socio-economic approach (starting with the survey of socio-economic conditions and giving first priority to socio-economic development);
- Potential for using locally-available, resources, technologies and craftsmanship;
- Openness to emerging environmental technologies;
- Potential for win-win solutions;
- Potential for overcoming institutional and/or cultural barriers to sustainable development; and
- Costs.

8. The execution of the second assessment task encompasses both the assessment of capacities to promote and apply the prioritised EST-options, and the identification of capacity building needs regarding the prioritised ESTs. The assessment should concentrate on **technological capacities** (ability to develop, test, manufacture, operate and evaluate technical installations), **training capacities** (ability to develop, deliver and evaluate training, education and extension work to relevant target groups), **institutional capacities** (ability to network and co-operate among different stakeholders (including financial institutions)) and **government capacities** (ability to prepare and implement policies, develop enforcement strategies, etc.).

9. The third assessment task requires the elaboration of the capacity building needs in 'ideas' for capacity building actions and technology transfer projects, in order to generate commitment among national stakeholders and to ensure proper follow-up of the NNA. A comparative evaluation of the project options should take place in order to select priority follow-up actions. The evaluation should include (i) the anticipated contribution to socio-economic development, (ii) the anticipated contribution to environmental improvement and (iii) the anticipated commitment of national stakeholders.

Phase 3: Strengthening and developing capacities

10. A mechanism for the periodic review of the implementation status, results and experiences of the prioritised capacity building actions and technology transfer projects should be established in order to ensure their effective implementation and in order to keep the NNA-process evolving.

11. Participants involved in the NNA-process should elaborate a few ideas for capacity building and technology transfer into more detailed project proposals in order to facilitate fund-raising in the national and international public and private sectors.

12. The government of the host country should ensure that the NNA will be managed in such a way that it results in strengthening of the institutional framework for the formulation and implementation of policies and strategies that foster the use of ESTs.

13. The government of the host country should take the lead in the co-ordinated implementation of the follow-up actions to the NNA, associated with major stakeholders. This should include amongst others:

- Initiation of prioritised technology transfer projects and supervision of prioritised capacity building actions;
- Co-ordination with private and public financing institutions and donor agencies; and
- Preparation and implementation of policies that foster the use of ESTs.

2.3 Promotion of the use of NNAs to improve the utilisation of ESTs in the development process of developing countries and countries in economic transition

14. Governments of developed and developing countries and countries in economic transition are encouraged to continue and expand the application of NNAs, using national and regional environmental action plans or sustainable development strategies, where existing.

15. International organisations, United Nations Organisations and the Organisation for Economic Co-operation and Development (OECD), national, regional and international financial institutions, Secretariats of the various international conventions, national governments and donor agencies, as well as regional organisations are encouraged to use the results and experiences gained with NNAs, in designing their policies and investment decisions. NNAs should also be used as an instrument for co-ordination among these agencies, institutions and organisations regarding EST-programmes.

16. The CSD should keep the issue of NNA as a priority issue on its agenda. Countries and international organisations are requested to provide information to the CSD on the execution and project implementation of NNAs in order to support the Commission in monitoring and evaluating the efficiency of NNAs for the improved utilisation of ESTs in the development process of developing countries and countries in economic transition.

17. An expertise network should be established and maintained among experienced and interested national, regional and international institutions in order to facilitate, among others:

- Execution and implementation of NNAs regarding ESTs in developing countries and countries in economic transition;
- Monitoring and evaluation of the efficiency of NNAs for improving the utilisation of ESTs in the development process of developing countries and countries in economic transition; and
- Compilation of guidelines and methodologies for NNA that have proven effective under specific conditions, for example, in the form of training kits, and disseminating them, e.g. through expert meetings, training seminars, travelling workshops etc. to national stakeholders.

18. Development co-operation agencies of donor countries are urged to adopt policies which establish the promotion of NNAs and capacity building regarding the use of ESTs as a distinct and substantive programme. Consistent

with this emphasis, they should also increase the allocation of financial resources to undertake NNAs and to transfer ESTs.

19. As many providers and recipients of ESTs are private enterprises, national and international public agencies should make a determined effort to establish a dialogue with business associations in industrialised and developing countries to involve private sectors in NNAs. Through their participation, private sectors may explore investment opportunities generated through the NNA and enhance technology co-operation.

Annex 1:
Guidance document on National Needs Assessments (NNAs) regarding Environmentally Sound Technologies (ESTs) for Developing Countries

1 Introduction

This document proposes a framework for National Needs Assessments (NNAs) regarding the improved utilisation of Environmentally Sound Technologies (ESTs) in the development process of developing countries and countries in economic transition. It aims at clarifying concepts, functions and possible applications in order to favour the application of NNAs. It is based on the results of the *International Expert Meeting on the Assessment of Technology Needs for Sustainability*, held in Scheveningen (The Hague, The Netherlands, February 5-7, 1996) and the preparatory work preceding it ([4]). The description of the framework is organised as follows:

1. Description of the main concepts regarding NNAs on ESTs and target groups (chapter 2);
2. Analysis of the added values of undertaking NNAs with suggestions for the effective use of NNAs to improve the utilisation of ESTs in the development process (chapter 3);
3. Outline for a methodology, which provides a framework for the preparation and execution of the NNA and management of its follow-up and specifies the activities which have to be undertaken in each phase of the NNA-process (chapter 4);
4. Closing remarks which summarise issues regarding the application of NNAs and success factors derived from NNAs undertaken so far (chapter 5).

2 Description of main concepts and target groups

2.1 National Needs Assessment

National Needs Assessments (NNAs) are a tool to improve the utilisation of Environmentally Sound Technologies (ESTs) in the transition towards sustainable development in developing countries and countries in economic transition ([5]). NNAs are undertaken to favour the use of those technologies in the development process which, in the particular national situation, are most appropriate to strike a reasonable balance between social concerns, economic growth and sustainable use of natural resources (including the protection of the environment) in achieving sustainable development objectives.

> *"A National Needs Assessment (NNA) is a tool for the government or other national stakeholders of a particular developing country or country in economic transition (designated as the 'host country'), to define a portfolio of capacity building actions and technology transfer projects to be undertaken to facilitate, and possibly accelerate, the development, adoption and implementation of Environmentally Sound Technologies (ESTs)".*

The interpretation given here to NNA, goes beyond a 'plain' assessment of needs. It includes a participatory priority setting process in order to arrive at priority capacity building actions and priority technology transfer projects. National needs regarding the use of ESTs are, in turn, determined by factors such as:

- *socio-economic factors*: importance of various economic sectors, expected social and/or economic developments such as industrial growth, income generation, employment etc.;
- *factors related to the scientific and technological infrastructure*: physical infrastructure, types and status of technology used, existing level to produce scientific inventions and technological innovations, local capacities to assess, adapt, maintain and improve technologies, including those transferred from abroad, etc.;

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[4] See Berkel, R. van et all (1996), National Needs Assessments regarding Environmentally Sound Technologies for Developing Countries, methodology and comparative evaluation, Report 96-02, IVAM Environmental Research, University of Amsterdam, The Netherlands

[5] The particular developing country or country in economic transition for which the NNA is undertaken is considered to be the 'host country' for that particular NNA

- *factors related to natural resources and the environment*: access to renewable and non renewable resources, climatological factors, vulnerability of local ecosystems (e.g. land degradation, air and water pollution), etc.;
- *regulatory and institutional factors:* development stage of environmental policies (including diversity of policy instruments), adopted regulatory framework and enforcement strategies and level of compliance;
- *demographic factors*: size and composition of the population, expected demographic developments, etc..

The interpretation given here to NNA, merges elements of *'technology needs assessment (TNA)'* and *'technology assessment (TA)'*. TNA deals with the identification of technological needs on the part of the *research community* (involved in technology development), and on the part of the *production community* (involved in technology utilisation). Once production problems, or technology needs, have been assessed, the TNA continues with a deliberate effort to identify the required knowledge, organisational arrangements, and hardware to cope with these production problems. On the other hand, Technology Assessment (TA) aims at evaluating prospects and risks associated with particular technologies. It covers a process of systematic evaluation of the social, economic, environmental and cultural impacts of a particular technology or activity of technological development. TA can contribute to the selection of technologies, which contribute to meeting the technological needs identified with a TNA, while minimising social and environmental trade-offs. As with TNA, the NNA starts with the assessment of technology needs, generally at a comparatively high level of abstraction. However, the NNA then adds a selection step, before going into the identification of the required knowledge and organisational arrangements, whereas a TNA does not include such selection step. The selection step uses elements of TA to select those technologies or technological developments, which are 'environmentally-sound' under the given circumstances. Consequently, the NNA results in the inventory of capacities to be created to improve the utilisation of ESTs for meeting national technology needs, whereas a regular TNA would result in the inventory of capacities to be created to improve the utilisation of technology in general.

2.2 Environmentally Sound Technologies (EST)

EST is a relative concept in that the term 'environmental soundness' cannot be attributed to any specific technology or specific group of technologies. This implies: (a) that what may be perceived as environmentally sound today may not necessarily be sound tomorrow; and (b) that any technology must be viewed in relation to the socio-economic, cultural and environmental conditions, thereby creating an interaction whose outcome needs to be constantly assessed.

> *"Technologies generally consist of both hardware (actual technical installations) and software (management systems in which these operate) components and are, generally, considered* ***environmentally sound*** *once they contribute best, in the particular national situation, to achieving, or restoring, the balance between objectives regarding social development, economic growth and sustainable use of natural resources (including protection of the environment)."*

This operationalisation of ESTs fits within the framework of the descriptions given in Agenda 21.

The division between 'EST' and 'non-EST' is governed by the *application* of the technology rather than the *specific types* of hardware (actual technical installations) or software (management system in which these installations operate). A particular technology may have both 'EST' as well as 'non-EST' applications. EST can be interpreted as the application of a particular technology ('solution') for a particular (part of a) socio-economic sector ('source of pollution') in order to reduce a particular environmental stress ('impact'). ESTs are most often categorised on a scale from *'preventive'* to *'reactive'*. Generally speaking, preventive environmental technologies avoid the generation of waste and emissions in the first place through modification and/or substitution of the pollution source, whereas reactive environmental technologies are applied to minimise the environmental impact of wastes and emissions after their generation.

2.3 Capacities

In consistency with the main objective of a NNA to improve the utilisation of ESTs in the transition towards sustainable development in developing countries, the term 'capacity', as used in the context of this guidance document, is interpreted as follows:

"Capacities which have to be strengthened, or possibly even developed, in order to facilitate, and possibly accelerate, the co-ordinated and planned development, acquisition/transfer, use and diffusion of ESTs."

Technology transfer regarding ESTs proves to be a process involving the following steps: (i) creating awareness of the need for ESTs; (ii) developing capacity for the absorption and/or adoption of ESTs; (iii) obtaining information and assessment of technological options; and (iv) implementing technology selection and managing technological change. Capacity building regarding ESTs is thus an essential condition for effective transfer and use of ESTs to take place. It includes training and professional development, as well as developing and enforcing a policy framework and regulatory strategies, creating awareness among general public and national stakeholders, providing facilities for organised stakeholders, institutions, NGOs and R&D communities to promote ESTs, etc..

The improved utilisation of ESTs thus calls for development of capacities in several fields, including - but most likely not limited to -:

- *technological capacity*: ability to develop, test, manufacture, operate and evaluate (technical) installations, like production plants, monitoring equipment etc.. The technological capacity includes the ability to conduct activities like Technology Needs Assessments, Technology Tracking and Technology Assessment;
- *training capacity*: ability to develop, deliver and evaluate training and education to various target groups within society. The training concept may receive a broad interpretation including elements of extension work, continuous education of various professional groups etc.;
- *institutional capacity*: ability to network and co-operate among different stakeholders (for instance industry, households, farmers, research & technology institutions, NGOs etc.) in order to serve common interests (like environmental protection);
- *government capacity*: ability to prepare, implement and enforce policies in different policy domains (like environmental protection, technology infrastructure, socio-economic development, education and training etc.).

The NNA assesses to what extent in each of these fields capacities have been developed which specifically enable the improved utilisation of ESTs. The NNA outcome is a programme of prioritised capacity building actions and technology transfer projects.

2.4 Target group and beneficiaries

Most importantly the NNA should address and support decision makers, which in turn can use the results of the NNA to improve the utilisation of ESTs in the development process of the host country. These decision makers may be in the government, but may also be individuals or organisations outside the government. Appointing the national government and/or organised stakeholders at the national level as the target group, clearly reflects the need to adopt national policies and strategies to promote ESTs. As this is generally not an easy task to achieve directly, it is desirable to acknowledge the importance of an intermediate target group of decision makers. The NNA-process may enable such individuals or organisations to become champions for the promotion of ESTs, which in turn enables them to influence the national government and modify national policies.

The follow-up to the NNA is to result in strengthening and developing capacities to enable the improved utilisation of ESTs. This may take place in governmental organisations as well as in institutions outside the administration (such as universities, technology and training institutes, extension centres, financing institutions, industry associations, chambers of commerce etc.). The institutions in which capacity building is to take place in the follow-up of the NNA, are considered the *target beneficiaries* of the NNA.

The execution of the NNA may be financed by the national government of the host country, in collaboration with involved stakeholders, or by funds external to the host country, such as grants from multi-lateral organisations or donor agencies of developed countries. The organiser and financier of the NNA-process may play a role in the creating an enabling environment for the NNA-process and supervising the execution of the NNA.

Within the frame of this guidance document, it is assumed that countries in economic transition, in particular countries in Central and Eastern Europe, may benefit in a similar way from the execution of a NNA as developing countries. Therefore no distinction is made between these categories. At the same time, NNAs could be a useful instrument for developed countries as well. However, the more matured institutional set up for the environmental

policies in developed countries, most likely already enables NNA-like processes. This guidance document is therefore focused on the application of NNAs for developing countries, including countries in economic transition.

3 Strategic considerations regarding application of NNAs for the improved utilisation of ESTs

3.1 Added value of the NNA-process

In addition to, and support for, ongoing technology transfer projects, NNAs may be undertaken to discover less obvious EST-opportunities, which upon implementation will contribute to both socio-economic development and environmental improvement. The ultimate objective of a NNA is to initiate and implement a selected number of priority projects in capacity-building regarding ESTs and transfer of prioritised EST-options.

The interest in the use of NNAs is evolving, because:

- capacity building regarding ESTs is an essential condition for effective technology transfer to take place;
- capacity building actions are most likely to be successful once these actions are based on the result of a solid assessment of the technology needs of the host country and once this needs assessment is endorsed by the most important stakeholders of the respective host country;
- the NNA-process may contribute to obtain participation of the private sector in its entity as owner of most technologies and source of finance, in the transfer of ESTs to, among, and within, developing countries and countries in economic transition;
- the NNA-process may contribute to obtaining participation of those sectors in which there is a large public sector involvement (like agriculture, energy, etc.); and
- the NNA-process may contribute to exploit the potential of ESTs to contribute to the transition towards sustainable development in developing countries and countries in economic transition.

On the basis of the experiences gained so far, it is most likely that the NNA-process has the following added values, provided that the NNA is properly followed up by capacity building actions and technology transfer projects:

- To the ***national government of the host country***, the NNA generates a portfolio of (i) capacity building actions which do facilitate, and possibly accelerate, the development, adoption and implementation of ESTs, and (ii) technology transfer projects regarding ESTs;
- To the ***international community and donor agencies***, the NNA presents an opportunity (i) to emphasise the 'demand-driven' approach and tailor international capacity building actions regarding ESTs to the actual needs of the beneficiaries in the recipient countries, and (2) to prepare technology transfer projects regarding ESTs which can be undertaken by the private sector and thereby use the potential technology offer and financing capacities of the private sector;
- The NNA-process and its follow-up offers to ***different stakeholders in the host country***, such as private sector, scientific and R&D community, NGOs, etc., in key sectors, such as agriculture, manufacturing, etc., in the host country an opportunity to enter into a national dialogue regarding socio-economic and environmental strategies and to participate in the planning and execution of capacity building actions and technology transfer projects regarding the use of ESTs; and
- A NNA is undertaken in order to ***discover less obvious EST-opportunities*** in order to contribute to both socio-economic development and environmental improvement. In bringing different stakeholders together and enhancing dialogue, the NNA could also discover niches for win-win-solutions.

Taking into account the early development stage of the NNA-methodology and the limited practical experiences, it is necessary to continue the application of the NNA-tool, and to evaluate its impact on the improvement of the utilisation of ESTs, in order to fully explore, and substantiate, the added value of conducting NNAs regarding ESTs for developing countries and countries in economic transition.

3.2 General model to improve utilisation of ESTs

The execution of NNAs and management of their follow-up benefits from the development of a methodology which outlines the various phases of the NNA-process, indicates the expected outcome for each of the phases, and specifies the tasks to be accomplished in order to achieve these outcomes. Such a planned approach has the advantage to better

safeguard the involvement of different local stakeholders, initiators of the NNA and potential financial institutions throughout the actual execution of the NNA and the follow-up projects.

The NNA is considered to be a continuous and iterative process, which can logically be organised in three phases, respectively:

1. ***Creating an enabling environment for NNA:*** Setting the stage for a NNA-process, by (i) creating favourable conditions, through either awareness raising and communication with stakeholders, and/or execution of pilot projects regarding transfer/acquisition of ESTs; and (ii) defining the NNA project (problem definition in order to set objectives, define participation of stakeholders, develop the organisational framework and raise necessary funds);
2. ***Assessing capacity building needs:*** Actual execution of the assessment tasks through data analysis and consultation of national stakeholders, resulting in a portfolio of prioritised capacity building actions and technology transfer projects; and
3. ***Strengthening and developing capacities***: Implementation of the portfolio of prioritised capacity building actions and prioritised technology transfer projects. The capacity building actions are to result in the application of ESTs, the definition and implementation of technology transfer projects regarding ESTs and an ongoing dialogue among national stakeholders, government and financing institutions regarding the implementation of ESTs. This phase also includes review activities in order to sustain the continuous process of assessing capacity building needs regarding the application of ESTs and the building of prioritised capacities.

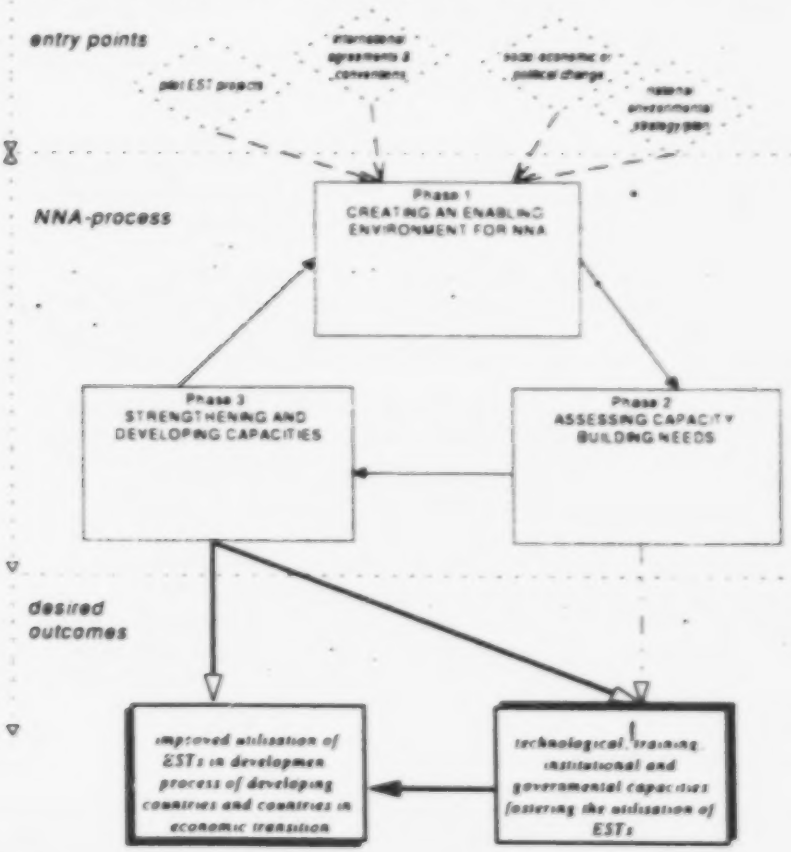
entry points
pilot EST projects
major economic or political change
NNA-process
Phase 1
CREATING AN ENABLING ENVIRONMENT FOR NNA
Phase 3
STRENGTHENING AND DEVELOPING CAPACITIES
Phase 2
ASSESSING CAPACITY BUILDING NEEDS
desired outcomes
improved utilisation of ESTs in developing countries and countries in economic transition
technological, training, institutional and governmental capacities fostering the utilisation of ESTs

Figure 1: General model to improve utilisation of ESTs.

The desired outcome of this NNA-process is the improved utilisation of ESTs in the development process of the host country, which is either achieved directly through implementation of technology transfer projects, or indirectly, through the strengthening and development of capacities which facilitate, and possibly accelerate, the development, adoption and implementation of ESTs. Different activities may actually trigger the initiation of the NNA-process, such as pilot EST technology transfer projects, international agreements and conventions, major socio-economic and/or political changes in the host country, national environmental policies and strategies, etc.. These all create entry-points for the NNA-process and provide the process with legitimacy. This overall model to improve the utilisation of ESTs through a NNA-process is illustrated in figure 1.

3.3 Applications for the NNA-process

Different types of NNAs may fit in general model for NNAs outlined above. Categorisations can be made along the following lines:

- *coverage of the assessment*: the NNA is either characterised as comprehensive (covering all important socio-economic sectors or all important national environmental problems) or partial (geared to a few major environmental problems or socio-economic sectors);
- *level of detail in the analysis*: the analysis of data and consultation of stakeholders for the execution of the NNA can be undertaken at different levels of detail, to be characterised as 'comparatively superficial' and 'comparatively in-depth'.

This results in a two by two matrix of types of NNAs, as shown in figure 2. The example NNA-like activities evaluated in detail (see van Berkel et all, 1996), are also depicted in figure 2.

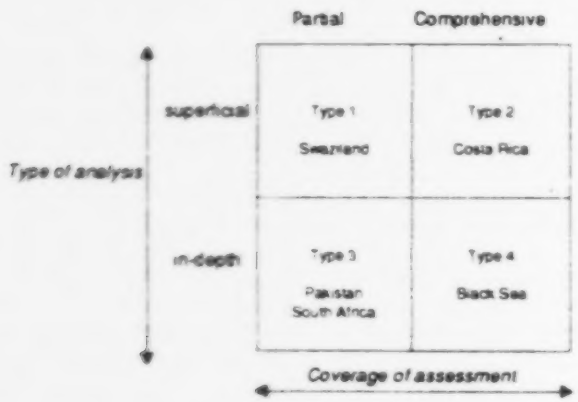

Figure 2: Classification of different types of NNAs.

The experiences gained so far, indicate that two types of NNA are most likely to be successful, respectively:

- comprehensive-coverage NNA based on comparatively-superficial analysis (designated as type 2 NNA); and
- partial-coverage NNA based on comparatively in-depth analysis (designated as type 3 NNA).

Types 1 and 4 are considered less appropriate. The disadvantage of type 1 (partial coverage NNA based on comparatively superficial analysis) is that this type of NNA is not likely to generate additional insights, as compared to normal project appraisal efforts. It is felt that the execution of type 4 (comprehensive coverage NNA based on comparatively in-depth analysis) requires too many resources, thereby delaying the actual acquisition/transfer of ESTs. Additionally, type 4 NNA will result in such a large number of project ideas that it will be complicated to arrive at consensus regarding priority capacity building actions and priority technology transfer projects and to manage the expectations raised by the NNA-process.

On the basis of the experiences gained so far, it is therefore suggested to apply:

- ***Comprehensive coverage NNA based on comparatively superficial analysis (type 2)***: in particular:
  (i) to develop or broaden general strategies to promote the development, acquisition/transfer, use and dissemination of ESTs; or
  (ii) to identify priority socio-economic sectors or environmental problems, in which ESTs are most likely to significantly support the development process of the developing country or country in economic transition; or
- ***Partial coverage NNA based on comparatively in-depth analysis (type 3)***: in particular to prepare a detailed action plan for the improved utilisation of ESTs in the development of a particular socio-economic sector or in the abatement of a particular environmental problem.

In order to exploit the potential of NNAs, it is also suggested to apply NNAs in a tier-wise mode, with alternatively type 2 NNA and type 3 NNA. Whether it is most appropriate to start with a type 2 NNA or with a type 3 NNA depends on local objectives and circumstances. A type 2 NNA could most usefully be undertaken to develop national strategies and plans, whereas a type 3 NNA based on these plans could define concrete actions for capacity building as well as define specific technology transfer projects.

3.4 International co-operation and co-ordination

Figure 1 shows that international agreements and conventions, as well as national plans and communications prepared in the framework of ongoing international co-operation programmes regarding ESTs could be entry points for the NNA-process. Therefore, such programmes can be used to foster the further development and application of the NNA-tool. Some of these programmes are for instance:

- ***Framework Convention on Climate Change***: participating countries are to prepare their national action plan regarding the abatement of climate change. Type 3 NNAs focused on identification of EST opportunities for abatement of climate change and related capacity building actions can in principle be used for the preparation of such national action plans.
- ***Cleaner Production Programme***: international organisations (in particular UNIDO and UNEP) and national donor agencies (such as USAID, NORADD, DANIDA etc.) are establishing national cleaner production centres in developing countries. Type 3 NNAs focused on the identification of EST-needs and -opportunities in the (small scale) manufacturing industry and related capacity building needs can in principle be used to develop and diversify the activities of these centres.
- ***International programmes for management of regional ecosystems***: several types of programmes (like GEF, EROS 2000 etc.), focus on the management of regional - aquatic - ecosystems (Black Sea, Baltic Sea, Danube etc.). Type 2 NNAs focused on the identification of EST-opportunities to protect these regional ecosystems and related capacity building actions can be used to prepare activity plans within these programmes.
- ***bilateral agreements*** on development assistance to support the transition to sustainable development (such as the bilateral sustainability agreements between The Netherlands and Costa Rica, Bhutan and Benin); within the framework of such agreements, type 2 NNAs can be used to prepare activity plans.
- ***Convention on Biological Diversity (CBD)***: parties to the convention are to prepare national assessments of biodiversity resources and national action plans, whereas the CBD secretariat is to produce for consideration by the subsidiary body on science, technical and technological advice documents that take into account ways and means to promote and facilitate access to, and transfer and development of, technology as envisioned in articles 16 and 18 of the Convention. Such documents are to develop and overview relevant existing mechanisms and activities, as well as identify unmet needs of parties, with respect to technology transfer. Type 3 NNA can be used to identify and consider EST-opportunities, including applications of biotechnology and enabling roles of capacity building, to conserve and sustainable develop natural biodiversity resources.

3.5 Expertise network

The NNA-practice may significantly benefit from the establishment of an expertise network among experienced and interested national, regional and international institutions in order to support, among others, in:

- Executing and implementing NNAs regarding ESTs in developing countries and countries in economic transition;
- Monitoring and evaluating the efficiency of NNAs for improving the utilisation of ESTs in the development process of developing countries and countries in economic transition; and

- Compiling guidelines and methodologies for NNA that have proven effective under specific conditions, for example, in the form of training kits, and disseminating them, e.g., through expert meetings, training seminars, travelling workshops etc. to national stakeholders.

4. Methodology for the execution of a NNA-process

The NNA-process has been divided in three phases, respectively (i) creating an enabling environment for NNA, (ii) assessing capacity building needs, and (iii) strengthening and developing capacities. Figure 3 lists the most important activities in each phase, as well as the expected outcome of each phase. This model of the assessment process is developed in order to facilitate the preparation and execution of different NNAs and to manage their follow-up. The NNA can be undertaken at different levels of detail, based on either comparatively-superficial analysis or comparatively-in-depth analysis of environmental problems, socio-economic conditions and technological opportunities (see also paragraph 3.3). The objectives of the particular NNA, as well as the expectations of national stakeholders and the opportunity of the initiator, as well as the organiser, to undertake follow-up activities, are crucial in defining the level of detail - and thus in turn the resource input - of the execution of the NNA.

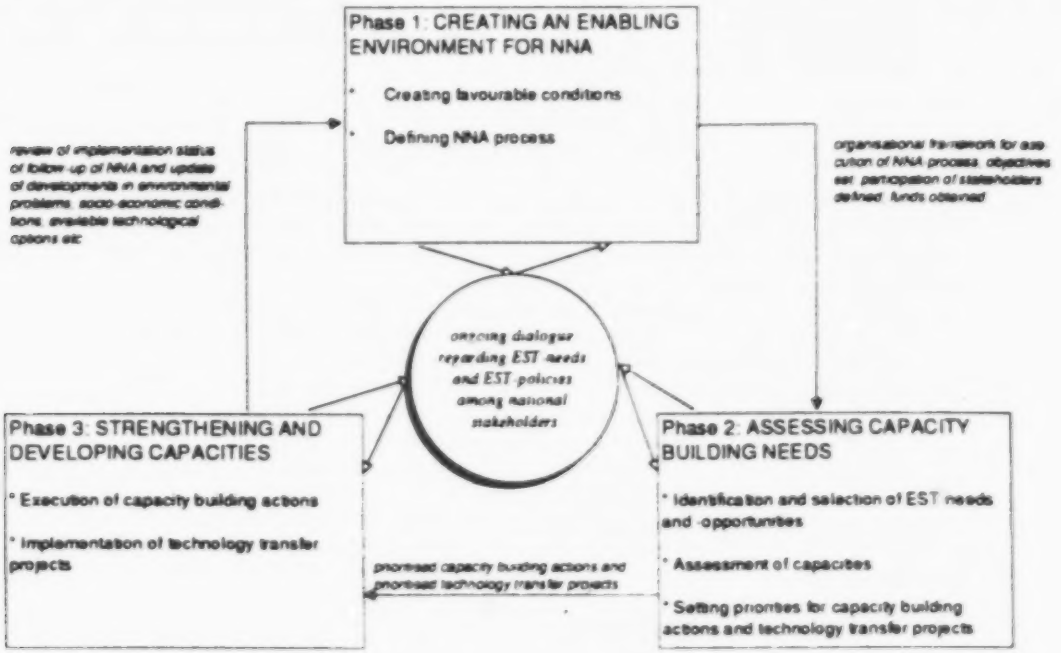
Phase 1: CREATING AN ENABLING ENVIRONMENT FOR NNA
* Creating favourable conditions
* Defining NNA process
review of implementation status of follow-up of NNA and update of developments in environmental problems, socio-economic conditions, available technological options etc
organisational framework for execution of NNA process, objectives set, participation of stakeholders defined, funds obtained
ongoing dialogue regarding EST needs and EST-policies among national stakeholders
Phase 3: STRENGTHENING AND DEVELOPING CAPACITIES
* Execution of capacity building actions
* Implementation of technology transfer projects
Phase 2: ASSESSING CAPACITY BUILDING NEEDS
* Identification and selection of EST needs and -opportunities
* Assessment of capacities
* Setting priorities for capacity building actions and technology transfer projects
prioritised capacity building actions and prioritised technology transfer projects

Figure 3: The NNA-process.

4.1 Creating an enabling environment for NNA

Creating an enabling environment for the NNA-process is important for enhancing the effectiveness of the NNA-process. It is based on two major activities, which may be undertaken simultaneously. These are:

1. ***Creating favourable conditions***: the execution of a NNA-process is only likely to be successful when favourable conditions are met in the host country. These include, among others: awareness of the socio-economic and environmental benefits of ESTs, motivation of important, national stakeholders to participate in the NNA-process (including management of its follow-up), proper qualification of the institution in charge of the execution of the NNA and availability of medium to long term national socio-economic and environmental planning;

2. ***Defining the NNA-process***: the framework for the execution of the NNA-process and implementation of its follow-up have to be set. This includes among others: setting of objectives, obtaining involvement and defining participation of national stakeholders and developing the organisational structure and workplan for the execution of the NNA. The expectations of the most important stakeholders have to be matched with each other at a realistic level, taking into account the time and finance constraints. Most important parties in this phase are national stakeholders (such as industry, government sector, research community, utility sector, NGOs, financing institutions, etc.), potential organisers and executors for the NNA and its follow-up.

Several activities may be considered in order to create favourable conditions, such as for instance:

- creating awareness of the socio-economic development potential of ESTs among national stakeholders, through among others (i) dialogue among, and with, organised stakeholders; (ii) information dissemination among general public; and (iii) implementation of demonstration projects regarding promising ESTs (practical demonstrations of the opportunities and benefits of selected ESTs at pilot sites);
- building capacity in local institutions to undertake and manage the NNA-process: most importantly the institution(s) in charge of the execution of the NNA, should have the ability to operate independently from, but respected by, most important national stakeholders, and be experienced in technology assessment and environmental planning. To this end the institutions should be well established in the target socio-economic sectors and well linked to both the government and its agencies and national stakeholders (including among others industry, NGOs and research community);
- support for medium to long term environmental and socio-economic planning: such planning may for instance result in a national development plan, a national environmental action plan or national conservation strategy, which in turn may provide a framework for the execution of the NNA-process.

Once favourable conditions have at least to a certain extent been created, the actual preparation of the NNA-process may start. Since the NNA may be undertaken in several different ways, this involves a number of strategic choices regarding objectives and scope of the NNA, selection of project partners and anticipated follow-up. In order to make informed choices, the following deserves recommendation:

- conduct a survey among stakeholders (including industry, government, NGOs, R&D community etc.) in order to identify which (policy-) initiatives are already undertaken and to take the results of these initiatives into account while defining the NNA-process;
- assure that local institutions have the ownership of the execution of the NNA;
- identify a strong, and committed, local actor to take the lead in the execution of the NNA;
- ensure participation of national stakeholders throughout the NNA-process;
- tailor the objectives of a particular NNA to long term environmental and socio-economic strategies and policies, provided that such strategies and policies are the result of a participatory process within the host country;
- make a preliminary assessment of the potential for funding of follow-up actions from resources available in the national and international, public and private sectors and tailor follow-up actions to realistic funding opportunities.

4.2 Assessing capacity building needs

In order to ensure implementation of follow-up actions, the assessment phase in the NNA-process should sustain, and possibly even increase, the awareness and commitment of national stakeholders and contribute to institutional capacity building. This cannot be done through a blue print approach; the approach should be adapted to nationally and internationally available information sources, match to socio-economic conditions, use existing networking structures and technical and organisational capacities. In general, the assessment phase should include three main assessment tasks, respectively:

1. ***Identification and selection of EST-needs and -opportunities***: inventory of technological options to alleviate environmental problems and preliminary evaluation of those options on economic, technical, cultural and environmental impacts in order to select the most promising technological options;
2. ***Assessment of capacities:*** assessment of the barriers and incentives regarding the application of the ESTs and formulation of capacity building needs; and

3. ***Setting priorities for capacity building actions and technology transfer projects***: comparative evaluation of capacity building needs and prioritisation of follow-up actions (including both capacity building actions and technology transfer projects).

Each task can be undertaken at different levels of detail; depending on the available resources and the expected follow-up for the NNA, a choice can be made between comparatively-superficial analysis tools (based on preliminary analysis of readily-available data) and comparatively-in-depth analysis tools (based on in-depth analysis of readily-available data and newly collected information). Furthermore, each task can in principle be undertaken at either ***micro-scale*** (at the level of individual enterprises, households, farmers, etc.), ***meso-scale*** (at the level of communities, industry sectors, etc.) and ***macro-scale*** (at the national level). It is well possible to undertake the different tasks at different scales: the identification and selection of EST-needs and -opportunities may for instance be based on plant level audits in representative industries (micro-level), while assessment of capacities is based on both the plant level assessment of the absorption potential for ESTs (micro-level) and assessment of the strengths and weaknesses of the environmental activities of industry associations etc. (meso-level) and setting of priorities for follow-up actions is undertaken in a roundtable-process with national stakeholders and government representatives (macro-level).

4.2.1 Identification and selection of EST-needs and -opportunities

The execution of the first assessment task encompasses both an inventory of ESTs and the selection of those ESTs relevant in light of the objectives of the NNA.

The *inventory* is to be based on the results of the following three inter-related surveys:

- ***Survey of environmental problems:*** covering target national or regional environmental problems (including inefficient use of resources) and anticipated developments therein;
- ***Survey of socio-economic conditions:*** covering socio-economic conditions under which the target socio-economic sectors are operating and - whenever feasible - the anticipated developments in socio-economic conditions; and
- ***Survey of appropriate technological options:*** covering appropriate technological options to reduce a particular environmental problem caused by a particular socio-economic sector.

The surveys can be undertaken simultaneously or consecutively. In the later case, the sequence should start with either the survey of environmental problems or the survey of socio-economic conditions, since starting with the survey of appropriate technological options would result in a technology-supply-driven bias in the identification of EST-opportunities.

With a view to identifying the most appropriate EST-needs and -opportunities, the *selection process*, should take into consideration:

- The perceived societal goals, which could determine the choice between an environmental approach (starting with the survey of environmental problems and opportunities and giving first priority to environmental impact) or socio-economic approach (starting with the survey of socio-economic conditions and giving first priority to socio-economic development);
- Potential for using locally-available resources, technologies and craftsmanship;
- Openness to emerging environmental technologies;
- Potential for win-win solutions;
- Potential for overcoming institutional and/or cultural barriers to sustainable development; and
- Costs of technological options.

Although 'inventory' and 'selection' are two distinct functions in this assessment task, it is most practical to merge both functions. To this end, the three constituent surveys are undertaken consecutively (instead of simultaneously). Upon completion of each constituent survey, a selection is made in order to gradually focus on the most promising EST-opportunities and most pressing EST-needs. As a matter of fact, this can be interpreted as placing a filter (or screen) between subsequent surveys; only the most important issues will be passed on to the next survey. The screen following the survey of environmental problems prioritises on environmental impact, whereas the screens following the survey of socio-economic conditions and survey of technological options prioritise on respectively importance of socio-economic conditions/developments and technical/economical feasibility. This integrated inventory and selection process is illustrated in figure 4.

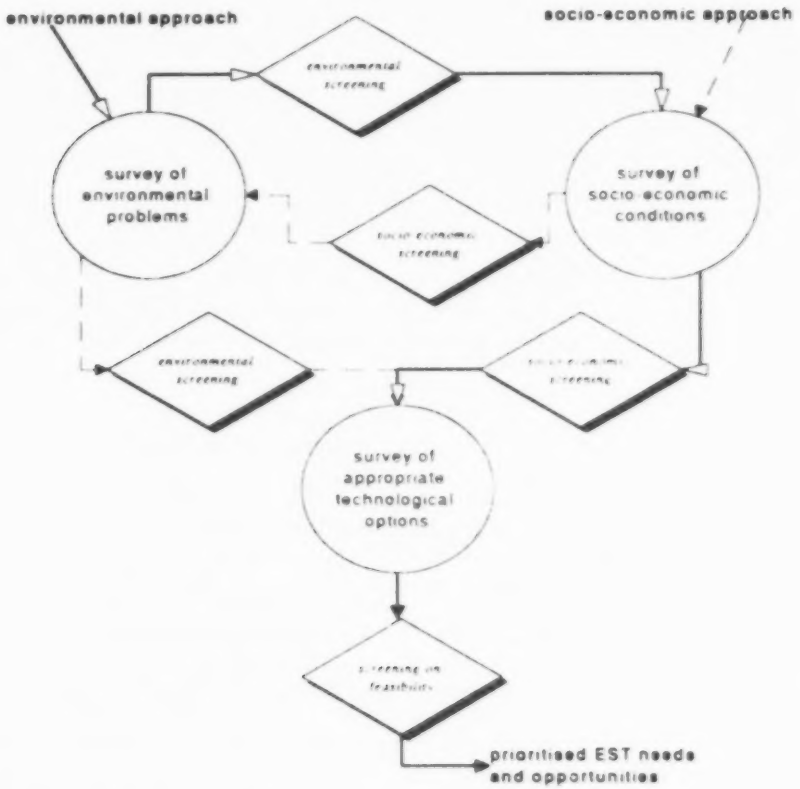

Figure 4: Schematic presentation of the identification and selection of EST-needs and -opportunities.

4.2.2 Assessment of capacities

The execution of this second assessment task encompasses both the assessment of capacities to promote and apply the prioritised EST-options, and the identification of capacity building needs regarding these prioritised ESTs.

The present functioning of key capacities for the development, adaptation and implementation of prioritised ESTs is to be evaluated. This assessment should concentrate on:

1. ***technological capacities:*** ability to develop, test, manufacture, operate and evaluate technical installations;
2. ***training capacities:*** ability to develop, deliver and evaluate training, education and extension work to relevant target groups within society;
3. ***institutional capacities:*** ability to network and co-operate among different stakeholders (including financial institutions, private sector, NGOs, etc.); and
4. ***government capacities:*** ability to prepare and implement policies, develop enforcement strategies, etc.

Whether and how the present status of these capacities affects the use of prioritised ESTs is to be characterised in a number or strong and weak points. The comparative analysis of these strong and weak points is to be used to generate an inventory of capacity building needs. Preferably this identification of capacity building needs is undertaken with participation, or at least active consultation, of the most involved stakeholders.

4.2.3 Setting priorities for capacity building actions and technology transfer projects

The third assessment task uses this inventory of capacity building needs as the starting point and aims to arrive at priority capacity building actions and priority technology transfer projects. This requires, first of all, the elaboration of the capacity building needs in 'ideas' for capacity building actions and technology transfer projects. These project ideas make the capacity building needs more practical, by explaining the relation between the capacity building need on one hand and the environmental problems and socio-economic conditions on the other hand, by proposing specific project activities to be undertaken to create the required capacities and by indicating who may execute, fund and benefit from these project activities, both on the short and the long term. The elaboration of capacity building needs into such project ideas is also instrumental in generating commitment among national stakeholders and safeguarding a proper follow-up of the NNA. Once the list of project ideas has been completed, a comparative evaluation of these project ideas should take place. It deserves recommendation to evaluate the project ideas at least with respect to:

- ***anticipated contribution to socio-economic development***: to what extent do the project activities contribute to socio-economic development ?
- ***anticipated contribution to environmental improvement***: to what extent do the project activities contribute to a reduction of prioritised national environmental problems ? and
- ***anticipated commitment of national stakeholders***: to what extent are national stakeholders in the host country committed to undertake, and possibly, co-finance the project activities ?

The comparative evaluation of the project ideas is then to result in the selection of priority capacity building actions and priority technology transfer projects. In order to enhance the effectiveness of the NNA-process, it is of utmost importance that this comparative evaluation reflects a reasonably balanced compromise of the different views of the most involved national stakeholders and that the prioritised capacity building actions and technology transfer projects are compatible with national policies.

4.3 Strengthening and developing capacities

This implementation and review phase in the NNA-process aims at (i) the planned and co-ordinated implementation of prioritised technology transfer projects and execution of prioritised capacity building actions; and (ii) the continuation of the dialogue on EST-needs and EST-policies between national stakeholders and the government and its agencies. This in turn should spur the further development, acquisition/transfer, use and diffusion of ESTs. In order to ensure the effective utilisation of ESTs in the development process of the host country, a mechanism is established for the periodic review of the implementation status, results and experiences of the prioritised capacity building actions and technology transfer projects. This periodic review may iterate a next cycle in the NNA-process and thus keeps the process evolving from alternatively 'assessing capacity building needs' to 'building prioritise[d] capacities', to 'assessing capacity building needs' etc..

The proper execution of this phase of the NNA-process calls for concerted action among key players, including national government of the host country and its agencies, other organised national stakeholders, beneficiaries of prioritised capacity building actions and technology transfer projects, donor agencies, national and international private sector and national NGOs. First of all, the participants involved in the NNA-process, elaborate the prioritised project ideas for capacity building and technology transfer into more detailed project proposals, which in turn should facilitate fund raising in the national and international public and private sectors. Next, the government of the host country is to take in association with major stakeholders, the lead in the management and co-ordinated implementation of technology transfer projects and execution of capacity building actions. This includes amongst others:

- initiation of prioritised capacity building actions and supervision of prioritised technology transfer projects;
- co-ordination with domestic and foreign private and public financing institutions and donor agencies; and
- preparation, implementation and enforcement of policies that foster the use of ESTs by different socio-economic sectors in society.

/...

5 Closing remarks

In addition to, and support of, ongoing technology transfer projects regarding Environmentally Sound Technologies (ESTs), National Needs Assessments (NNAs) may be undertaken to discover less obvious EST-opportunities, which upon implementation will contribute to both socio-economic development and environmental improvement. The ultimate objective of a NNA is to initiate and implement a selected number of priority projects in capacity-building regarding ESTs and transfer of prioritised EST-options.

A number of issues influence the application of NNAs regarding the utilisation of ESTs in developing countries and countries in economic transition. These include:

- *conceptual and technological issues*: regarding differences in interpretation and expectations towards ESTs, NNAs and their target group and the role of stakeholders in the NNA-process;
- *methodological issues*: regarding the question of how to manage each phase in the NNA-process (as specified in figure 3) and how to execute each assessment task (as introduced in paragraphs 4.2.1-4.2.3);
- *strategic and organisational issues*: regarding favourable approaches in planning NNAs and obtaining involvement from national stakeholders, national government and financing institutions in both the further use of NNAs and in the expansion of policies and investments in technology transfer regarding ESTs..

The framework presented here as well as the insight gained from the evaluation study and from the Expert Meeting, contribute significantly to clarifying these issues. However, further experimentation with NNAs and evaluation of their impact on the actual development of capacities and transfer of ESTs in developing countries and countries in economic transition is needed to further deepen the insight in favourable approaches to NNAs.

The success of conducting a NNA appears to depend heavily on a series of success factors, including at least (in random order):

- ***qualification of the institution in charge of the assessment***: as execution of the NNA is a process of networking and dialogue, the institution in charge should have the ability and authority to operate independently from, but respected by, the most important parties involved (including national government, financier, industry and R&D community). Preferably the institution in charge has experience in technology assessment, environmental and/or socio-economic planning and is used to work with both national consultants and international experts in order to complete specialised sub-tasks within the NNA;
- ***commitment of the national government***: this commitment is preferably reflected in socio-economic and environmental long term planning and in assigning the responsibility for the co-ordinated implementation and review of follow-up projects to a high-level body with participation of most involved national stakeholders;
- ***commitment of the organiser (or financier)***: this commitment is preferably reflected in efforts to safeguard the transparency and consistency of the NNA-process, without interfering with the content of the NNA-process (in order to avoid a supply-or finance-driven bias), and a sincere commitment to assist in fund raising for execution of prioritised capacity building actions and implementation of prioritised technology transfer projects;
- ***participation of stakeholders throughout the process of preparation and execution of the NNA-process and management of its follow-up***: participation of a variety of stakeholders, each preferably represented by at least a few institutions, appears crucial in order (i) to contribute to consensus building regarding priority capacity building actions and priority technology transfer projects; and (ii) in assuring that the 'needs' identified do not just cater to 'wishes' of a few individuals or mandate of one institution. True participation requires time to allow stakeholders to become involved and formulate their needs and views. Once the NNA-process is designed and planned in consultation with important stakeholders, it is most likely that the stakeholders will actually participate in the execution of the NNA and management of its follow-up;
- ***transparency in approach and methodology***: transparency in the approach and methodology adopted greatly enhances the consensus-building potential of the NNA (among national stakeholders) and may facilitate fund-raising for execution of prioritised capacity building actions and implementation of prioritised technology transfer projects. Transparency is especially needed with regard to priority setting between technological options, priority setting among environmental problems and priority setting regarding options for capacity building and technology transfer;
- ***ability to generate new insights***: the dialogue which is to be initiated and strengthened through the NNA-process, is most likely to have a long lasting impact, if new insights are presented and/or generated. The NNA should therefore have an in-build ability to generate new insights, for instance by making a highly innovative

identification and selection of EST-needs and -opportunities, conducting in-depth environmental and/or socio-economic examinations in pilot settings, considering innovative policy instruments etc.;

- ***ability to provide proper, and timely, follow-up to the NNA:*** the NNA-process is to create momentum for building capacity regarding the uptake of ESTs. Such momentum is easily lost, in case of a delay and/or inappropriate match of the follow-up for the NNA.

Annex 2:
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Background document

Berkel, R. van, C. Westra, F. Verspeek, P. Lasschuit and L. Pietersen, *National Needs Assessment regarding Environmentally Sound Technologies for Developing Countries, methodology and comparative evaluation* Report: 96-02, IVAM Environmental Research, University of Amsterdam, 1996.